

EXHIBIT 15

IEEE Std 100-1996

The IEEE Standard Dictionary of Electrical and Electronics Terms

Sixth Edition

**Standards Coordinating Committee 10, Terms and Definitions
Jane Radatz, Chair**

This standard is one of a number of information technology dictionaries being developed by standards organizations accredited by the American National Standards Institute. This dictionary was developed under the sponsorship of voluntary standards organizations, using a consensus-based process.

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Introduction

Since the first edition in 1941 of the American Standard Definitions of Electrical Terms, the work now known as IEEE Std 100, The IEEE Standard Dictionary of Electrical and Electronics Terms, has evolved into the unique compendium of terms that it is today.

The current edition includes all terms defined in approved IEEE standards through December 1996. Terms are categorized by their technical subject area. They are also associated with the standards or publications in which they currently appear. In some cases, terms from withdrawn standards are included when no current source can be found. Earlier editions of IEEE Std 100 included terms from sources other than IEEE standards, such as technical journals, books, or conference proceedings. These terms have been maintained for the sake of consistency and their sources are listed with the standards in the back of the book.

The practice of defining terms varies from standard to standard. Many working groups that write standards prefer to work with existing definitions, while others choose to write their own. Thus terms may have several similar, although not identical, definitions. Definitions have been combined wherever it has been possible to do so by making only minor editorial changes. Otherwise, they have been left as written in the original standard.

Users of IEEE Std 100 occasionally comment on the surprising omission of a particular term commonly used in an electrical or electronics field. This occurs because the terms in IEEE Std 100 represent only those defined in the existing or past body of IEEE standards. To respond to this, some working groups obtain authorization to create a glossary of terms used in their field. All existing, approved standard glossaries have been incorporated into this edition of IEEE Std 100, including the most current glossaries of terms for computers and power engineering.

IEEE working groups are encouraged to refer to IEEE Std 100 when developing new or revised standards to avoid redundancy. They are also encouraged to investigate deficiencies in standard terms and create standard glossaries to alleviate them.

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How to use this dictionary

The terms defined in this dictionary are listed in *letter-by-letter* alphabetical order. Spaces are ignored in this style of alphabetization, so *cable value* will come before *cub signal*. Descriptive categories associated with the term in earlier editions of IEEE Std 100 will follow the term in parentheses. New categories appear after the definitions (see Categories, below), followed by the designation of the standard or standards that include the definition. If a standard designation is followed by the letter s, it means that edition of the standard was superseded by a newer revision and the term was not included in the revision. If a designation is followed by the letter w, it means that edition of the standard was withdrawn and not replaced by a revision. A bracketed number refers to the non-IEEE standard sources given in the back of the book.

Acronyms and abbreviations are no longer listed in a separate section in the dictionary; rather, they are incorporated alphabetically with other terms. Each acronym or abbreviation refers to its expanded term, where it is defined. Acronyms and abbreviations for which no definition was included in past editions have been deleted from this edition of IEEE Std 100.

Abstracts of the current set of approved IEEE standards are provided in the back of the book. It should be noted that updated information about IEEE standards can be obtained at any time from the IEEE Standards World Wide Web site at <http://standards.ieee.org/>.

Categories

The category abbreviations that are used in this edition of IEEE Std 100 are defined below. This information is provided to help elucidate the context of the definition. Older terms for which no category could be found have had the category "Std100" assigned to them. Note that terms from sources other than IEEE standards, such as the National Electrical Code® (NEC®) or the National Fire Protection Association, may not be from the most recent editions; the reader is cautioned to check the latest editions of all sources for the most up-to-date terminology.

compensated-loop direction-finder

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compiler

compensated-loop direction-finder A direction-finder employing a loop antenna and a second antenna system to compensate polarization error. *See also:* radio receiver.

(EEC/PE) [119]

compensated repulsion motor A repulsion motor in which the primary winding on the stator is connected in series with the rotor winding via a second set of brushes on the commutator in order to improve the power factor and commutation.

(PE) [9]

compensated semiconductor (charged-particle detectors) (germanium gamma-ray detectors) (x-ray energy spectrometers) A semiconductor in which one type of impurity or imperfection (for example, donor) partially cancels the electric effects of the other type of impurity or imperfection (for example, acceptor).

(IM/NPS) 300-1982s, 314-1971w, 325-1986s

compensated series-wound motor A series-wound motor with a compensating-field winding. The compensating-field winding and the series-field winding may be combined into one field winding. *See also:* asynchronous machine.

(PE) [9], 224-1965w

compensating-field winding (rotating machinery) Conductors embedded in the pole shoes and their end connections. It is connected in series with the commutating-field winding and the armature circuit. *Note:* A compensating-field winding supplements the commutating-field winding, and together they function to assist the reversal of current in the armature coils for successful commutation. *See also:* asynchronous machine.

(EEC/PE) [119]

compensating-rope sheave switch A device that automatically causes the electric power to be removed from the elevator driving-machine motor and brake when the compensating sheave approaches its upper or lower limit of travel. *See also:* hoistway.

(EEC/PE) [119]

compensation (control system feedback) A modifying of supplementary action (also, the effect of such action) intended to improve performance with respect to some specified characteristic. *Note:* In control usage, this characteristic is usually the system deviation. Compensation is frequently qualified as series, parallel, feedback, etc., to indicate the relative position of the compensating element. *See also:* control system, feedback; equalization.

(PE) [3], 421-1972s

compensation, error Form of error processing when the erroneous state contains enough redundancy to enable correct service delivery.

(BA/C) 896.9-1994

compensation theorem States that if an impedance is inserted in a branch of a network, the resulting current increment produced in any branch in the network is equal to the current that would be produced at that point by a compensating voltage, acting in series with the modified branch, whose values is I , where I is the original current that flowed where the impedance was inserted before the insertion was made.

(EEC/PE) [119]

compensator (1) (rotating machinery) An element or group of elements that acts to modify the functioning of a device in accordance with one or more variables. *See also:* asynchronous machine.

(PE) [9]

(2) **(radio direction-finders)** That portion of a direction-finder that automatically applies to the direction indication all or a part of the correction for the deviation. *See also:* radio receiver.

(EEC/PE) [119]

(3) **(excitation systems)** A feedback element of the regulator that acts to compensate for the effect of a variable by modifying the function of the primary detecting element. *Notes:* 1. Examples are reactive current compensator and active current compensator. A reactive current compensator is a compensator that acts to modify the function of a voltage regulator in accordance with reactive current. An active current compensator is a compensator that acts to modify the function of a voltage regulator in accordance with active current. 2. Historically, terms such as equalizing reactor and

cross-current compensator have been used to describe the function of a reactive compensator. These terms are deprecated. 3. Reactive compensators are generally applied with generator voltage regulators to obtain reactive current sharing among generators operating in parallel. They function in the following two ways.

1) Reactive droop compensation is the more common method.

It creates a droop in generator voltage proportional to reactive current and equivalent to that which would be produced by the insertion of a reactor between the generator terminals and the paralleling point.

2) Reactive differential compensation is used where droop in generator voltage is not wanted. It is obtained by a series differential connection of the various generator current transformer secondaries and reactive compensators. The difference current for any generator from the common series current creates a compensating voltage in the input to the particular generator voltage regulator which acts to modify the generator excitation to reduce to minimum (zero) its differential reactive current.

3) Line drop compensators modify generator voltage by regulator action to compensate for the impedance drop from the machine terminals to a fixed point. Action is accomplished by insertion within the regulator input circuit of a voltage equivalent to the impedance drop. The voltage drops of the resistance and reactance portions of the impedance are obtained, respectively, in per unit quantities by an active compensator and a reactive compensator.

(PE) 421-1972s

(4) (as applied to relaying) A transducer with an air-gapped core that produces an output voltage proportional to input current. The voltage modifies (or compensates) the voltage applied to the relay.

(PE/SWG) C37.100-1992

compensatory leads Connections between an instrument and the point of observation so contrived that variations in the properties of leads, such as variations of resistance with temperature, are so compensated that they do not affect the accuracy of the instrument readings. *See also:* auxiliary device to an instrument.

(EEC/PE) [119]

compensatory wiring techniques (coupling in control systems) Those wiring techniques which result in a substantial cancellation or counteracting of the effects of rates of change of electric or magnetic fields, without actually obstructing or altering the intensity of the fields. If the signal wires are considered to be part of the control circuit, these techniques change the susceptibility of the circuit. Example: twisting of signal and return wires associated with a susceptible instrument so as to cancel the voltage difference between wires caused by an existing varying magnetic field. *See also:* barrier wiring techniques; suppressive wiring techniques.

(IA) 518-1982r

competent person One who, because of training, experience, and authority is capable of identifying and correcting hazardous or dangerous conditions in the fall arrest system or any component thereof under consideration, as well as its application and use with related equipment.

(PE/T&D) 1307-1996

competitor (1) (NuBus) A master that participates in a particular arbitration contest.

(C/MM) 1196-1987

(2) A module actively participating in the current control acquisition cycle of the arbitration process.

(BA/C) 10857-1994, 896.3-1993, 896.4-1993

compile (software) To translate a computer program expressed in a high-order language into its machine language equivalent. *Contrast:* assemble; decompile; interpret.

(C) 610.12-1990

compile-and-go (software) An operating technique in which there are no stops between the compiling, linking, loading, and execution of a computer program. (C) 610.12-1990

compiler (software) A computer program that translates programs expressed in a high-order language into their machine

done.correct

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dose equivalent

the dominant wavelength cannot be given (this applies to purples), its place is taken by the complementary wavelength.

(BT) 201-1979w

(2) (of a light) The wavelength of radiant energy of a single frequency that, when combined in suitable proportion with the radiant energy of a reference standard, matches the color of light.

(EEC/IE) [126]

done.correct A status code that is returned when a transaction is completed without errors. On many buses, the done.correct status is implicitly assumed when no error-status codes are observed.

(C/MM) 1212-1991s

Dunn potential (electrobiology) The potential difference across an inert semipermeable membrane separating mixtures of ions, attributed to differential diffusion. *See also:* electrobiology.

(EMB) [47]

donor *See:* semiconductor.

do-nothing instruction *See:* dummy instruction.

do-nothing operation *See:* no-operation.

door (gate closer) A device that closes a manually opened hoistway door, a car door, or gate by means of a spring or by gravity. *See also:* hoistway.

(EEC/PE) [119]

door contact (burglar-alarm system) An electric contacting device attached to a door frame and operated by opening or closing the door. *See also:* protective signaling.

(EEC/PE) [119]

door or gate power operator A device, or assembly of devices, that opens a hoistway door and/or a car door or gate by power other than by hand, gravity, springs, or the movement of the car; and that closes them by power other than by hand, gravity, or the movement of the car. *See also:* hoistway.

(EEC/PE) [119]

dopant (1) (acceptor) (semiconductor) An impurity that may induce hole conduction. *Synonym:* impurity. *See also:* semiconductor device.

(Std100)

(2) (donor) (semiconductor) An impurity that may induce electron conduction. *See also:* impurity; semiconductor device.

(IA) [12]

Dopen-loop phase angle *See:* loop phase angle.

Dopen-shut control system *See:* control system, on-off.

doping (semiconductor) Addition of impurities to a semiconductor or production of a deviation from stoichiometric composition, to achieve a desired characteristic. *See also:* semiconductor.

(ED) 216-1960w

doping compensation (semiconductor) Addition of donor impurities to a p-type semiconductor or of acceptor impurities to an n-type semiconductor. *See also:* semiconductor.

(IA) [12]

Doppler beam sharpening (DBS) A special form of synthetic-aperture radar (SAR) processing that uses a constant frequency reference. DBS conventionally has a short integration time and is commonly used to sharpen the scanning antenna beam of air-to-ground radars.

(AE) 686-1990w

Doppler effect (1) (communication satellite) The effective change of frequency of a received signal due to the relative velocity of a transmitter with respect to receiver. In space communications the frequency shifts due to the Doppler effect may be significant when the velocity of the spacecraft relative to earth is high; the frequency shifts are used to determine the velocity of vehicles.

(COM) [25]

(2) For an observer, the apparent change in frequency of a wave when there is relative motion between the source and the observer.

(AP) 211-1990

(3) (data transmission) The phenomenon changing the observed frequency of a wave in a transmission system caused by a time rate of change in the effective length of the path of travel between the source and the point of observation.

(PE) 599-1985w

Doppler filter An equipment designed to enhance the radar response to targets at a selected Doppler frequency relative to targets, clutter, or noise at other frequencies.

(AE) 686-1990w

Doppler-inertial navigation equipment (navigation aid terms) Hybrid navigation equipment which employs both Doppler navigation radar and inertial sensors.

(AE) 172-1983w

Doppler frequency (radio-wave propagation) Of a wave traveling between a source and a point, the shift in frequency of the wave caused by the change of phase path with time. *Note:* The change may be due to variations in the separation of source and the point or in the refractive index of the intervening medium.

(AP) 211-1977s

Doppler navigator (navigation aid terms) A self-contained dead reckoning navigation aid transmitting two or more beams of electromagnetic or acoustic energy outward and downward from the vehicle and utilizing the Doppler effect of the reflected energy, a reference direction, and the relationship of the beams to the vehicle to determine speed and direction of motion over the reflecting surface.

(AE) 172-1983w

Doppler radar A radar that utilizes the Doppler effect to determine the radial component of relative radar-target velocity or to select targets having particular radial velocities.

(AE) 172-1983w, 686-1990w

Doppler shift The magnitude of the change in the observed frequency of a wave due to the Doppler effect. The unit is the hertz.

(SP) [32]

Doppler spread *See:* spread, Doppler.

Doppler tracking (communication satellite) A method of determining the position of an observer on earth using the known (exact) satellite transmission frequency and the known satellite ephemeris and measuring the Doppler frequency shift of the signal received from the satellite.

(COM) [19]

Doppler VOR (navigation aid terms) (very high-frequency omnidirectional range) A very high frequency radio range, operationally compatible with conventional VOR, less susceptible to siting difficulties because of its increased aperture. In it the variable signal (the signal producing azimuthal information) is developed by sequentially feeding a radio frequency signal to a multiplicity of antennas disposed in a ring-shaped array; the array usually surrounds the central source of reference signal.

(AE) 172-1983w

dormancy (accelerometer) (gyros) The state wherein a device is connected to a system in the normal operational configuration and experiences below-normal, often periodic structural, mechanical, electrical, or environmental stresses for prolonged periods before being used in a mission. Dormancy consists of a long, predominantly inactive, period where material and component degradation effects due to age and/or storage environment dominate.

(AE) 528-1994

DOR violation A word-serial protocol error that occurs when a servant receives a DOR synchronized command (such as *byte request*) and is unable to process that command because the DOR bit is zero (0).

(C/MM) 1155-1992

dose (1) (photovoltaic power system) The radiation delivered to a specified area of the whole body. *Note:* Units of dose are rads or roentgens for X or gamma rays and rads for beta rays and protons. *See also:* photovoltaic power system.

(AE) [41]

(2) The amount of a chemical or other agent delivered to an organism; usually normalized to the mass of an organism.

(PE/T&D) 539-1990

dose equivalent The product, H , of the absorbed dose, D , and the quality factor, Q , at the point of interest in tissue.

 $H = DQ$

The shallow and deep dose equivalents, H_s and H_d , are the dose equivalents at depths in tissue of 0.07 mm and 10 mm, respectively. The SI unit of dose equivalent has been given the special name of sievert (Sv).

 $1\text{ Sv} = 1\text{ J/kg}$

Note: For photon and beta radiation, Q may be taken as equal to unity for external radiations.

(NI) N42.20-1995